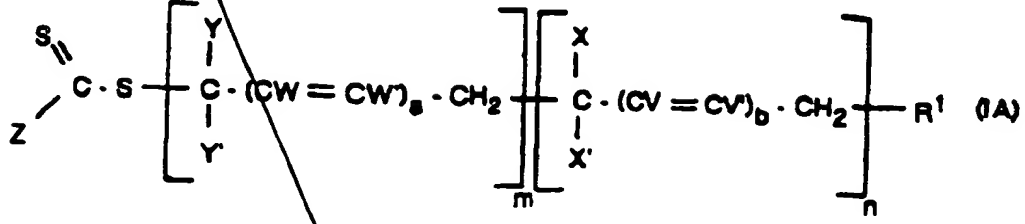
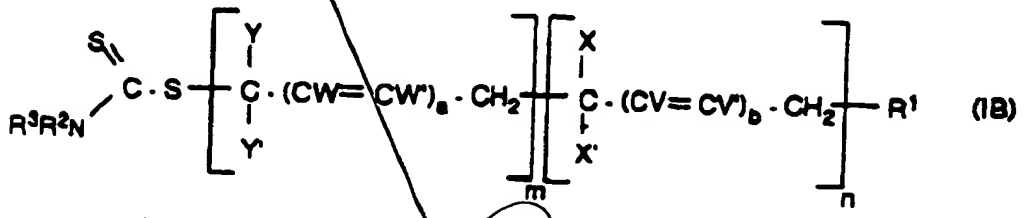
CLAIMS

1. Process for preparing block polymers of general formula (IA) or (IB):



(IA)



(IB)

in which formulae:

- R^1 represents:
  - an optionally substituted alkyl, acyl, aryl, alkene or alkyne group (i), or
  - an optionally substituted or aromatic, saturated or unsaturated, carbocycle (ii), or
  - an optionally substituted or aromatic, saturated or unsaturated, heterocycle (iii),

it being possible for these groups and rings (i), (ii) and (iii) to be substituted with substituted phenyl groups, substituted aromatic groups, or groups: alkoxycarbonyl or aryloxycarbonyl (-COOR), carboxyl (-COOH), acyloxy ($-O_2CR$), carbamoyl ($-CONR_2$), cyano (-CN), alkylcarbonyl, alkylarylcarbonyl,

arylcarbonyl, arylalkylcarbonyl, phthalimido, maleimido, succinimido, amidino, guanidimo, hydroxyl (-OH), amino ($-NR_2$), halogen, allyl, epoxy, alkoxy (-OR), S-alkyl, S-aryl, organosilyl, groups having a hydrophilic or ionic character, such as the alkali metal salts of carboxylic acids, the alkali metal salts of sulphonic acid, polyalkylene oxide chains (PEO, PPO), cationic substituents (quaternary ammonium salts),

R representing an alkyl or aryl group,

- **Z** is an optionally substituted ring comprising a nitrogen atom via which Z is linked to the C(=S)-S- group of formula (IA), the other atoms of the said ring inducing a delocalizing or electron-withdrawing effect with respect to the electron density of the nitrogen atom,

-$\mathbf{R^2}$ and $\mathbf{R^3}$, which are identical or different, represent:

- an optionally substituted alkyl, acyl, aryl, alkene or alkyne group (i), or
- an optionally substituted or aromatic, saturated or unsaturated, carbocycle (ii), or
- an optionally substituted, saturated or unsaturated, heterocycle (iii),

it being possible for these groups and rings (i), (ii) and (iii) to be substituted with:

. substituted phenyl groups or substituted aromatic groups,

. groups: alkoxycarbonyl or aryloxycarbonyl

(-COOR), carboxyl (-COOH), acyloxy ($-O_2CR$), carbamoyl ($-CONR_2$), cyano (-CN), alkylcarbonyl, alkylarylcarbonyl, arylcarbonyl, arylalkylcarbonyl, phthalimido, maleimido, succinimido, amidino, guanidimo, hydroxyl (-OH), amino ($-NR_2$), halogen, allyl, epoxy, alkoxy (-OR), S-alkyl, S-aryl,

. groups having a hydrophilic or ionic character, such as the alkali metal salts of carboxylic acids, the alkali metal salts of sulphonic acid, polyalkylene oxide chains (PEO, PPO), cationic substituents (quaternary ammonium salts),

R representing an alkyl or aryl group,

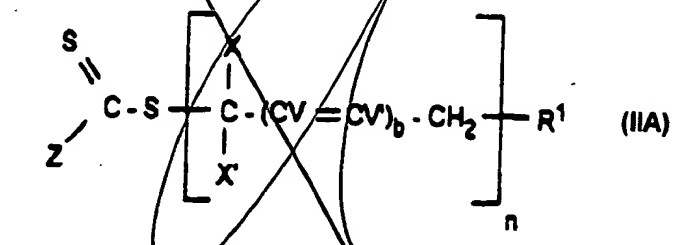
and, for at least R^2 or R^3, these groups and rings (i), (ii) and (iii) induce a delocalizing or electron-withdrawing effect with respect to the electron density of the nitrogen atom to which R^2 and R^3 are linked,

- **V**, **V'**, **W** and **W'**, which are identical or different, represent: H, an alkyl group or a halogen,
- **X**, **X'**, **Y** and **Y'**, which are identical or different, represent H, a halogen or a group chosen from R', OR', OCOR', NHCOH, OH, NH_2, NHR', $N(R')_2$, $(R')_2N^+O^-$, NHCOR', CO_2H, CO_2R', CN, $CONH_2$, CONHR' or $CONR'_2$, in which R' is chosen from alkyl, aryl, aralkyl, alkaryl, alkene or organosilyl groups, optionally perfluorinated and optionally substituted with one or more carboxyl, epoxy, hydroxyl, alkoxy, amino, halogen or sulphonic groups,

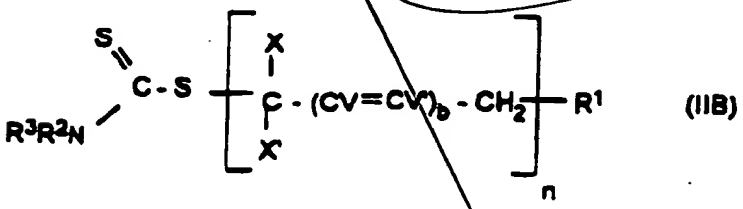
- **a** and **b**, which are identical or different, are equal to 0 or 1,
- **m** and **n**, which are identical or different, are greater than or equal to 1 and, when one or other is greater than 1, the individual repeat units are identical or different,

in which process the following are brought into contact with each other:

- an ethylenically unsaturated monomer of formula: $CYY'(=CW-CW')_a=CH_2$,
- a precursor compound of general formula (IIA) or (IIB):



(IIA)



(IIB)

in which Z, X, X', V, V', R^1, R^2 and R^3 have the same meaning, and b and n the same value, as previously;

- a radical polymerization initiator.

2. Process according to claim 1, characterized in that the ethylenically unsaturated monomer is chosen from: styrene or its derivatives, butadiene,

chloroprene, (meth)acrylic esters and vinyl nitriles.

3. Process according to claim 1 or 2, characterized in that, in compounds of formula (IA) and (IIA), the ring Z is a ring based on carbon atoms.

4. Process according to any one of the preceding claims, characterized in that the ring Z includes at least one heteroatom other than the nitrogen which links the ring Z to -C(=S)S, this heteroatom being chosen from O, S, N and/or P.

5. Process according to any one of the preceding claims, characterized in that, in the compounds of formula (IA) and (IIA), the ring Z is an aromatic ring.

6. Process according to any one of the preceding claims, characterized in that, in the compounds of formula (IA) and (IIA), the ring Z comprises at least one of the following functional groups: carbonyl (C=O), SO_2, POR", R" representing an alkyl, aryl, OR, SR or NR_2 group, where the R is identical or different and represents an alkyl or aryl group.

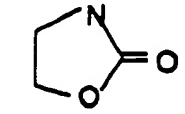
7. Process according to any one of the preceding claims, characterized in that, in the compounds of formula (IA) and (IIA), the ring Z is substituted with at least one of the following groups: alkyl, aryl, alkoxycarbonyl or aryloxycarbonyl (-COOR), carboxyl (-COOH), acyloxy ($-O_2CR$), carbamoyl ($-CONR_2$), cyano (-CN), alkylcarbonyl, alkylarylcarbonyl, arylcarbonyl, arylalkylcarbonyl, phthalimido, maleimido, succinimido, amidino, guanidimo, hydroxyl (-OH), amino ($-NR_2$),

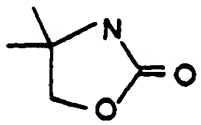
halogen, allyl, epoxy, alkoxy (-OR), S-alkyl, S-aryl, groups having a hydrophilic or ionic character, such as the alkali metal salts of carboxylic acids or the alkali metal salts of sulphonic acid, polyalkylene oxide chains (PEO, PPO), cationic substituents (quaternary ammonium salts), R representing an alkyl or aryl group.

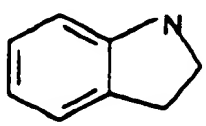
8. Process according to any one of the preceding claims, characterized in that, in the compounds of formula (IA) and (IIA), the ring Z is substituted with at least one carbocycle or a heterocycle, this being optionally aromatic and/or substituted.

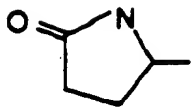
9. Process according to the preceding claim, characterized in that, in the compounds of formula (IA) and (IIA), the ring Z and its cyclic substituent have two common atoms.

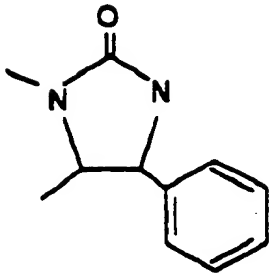
10. Process according to any one of the preceding claims, characterized in that the ring Z is chosen from one of the following rings:











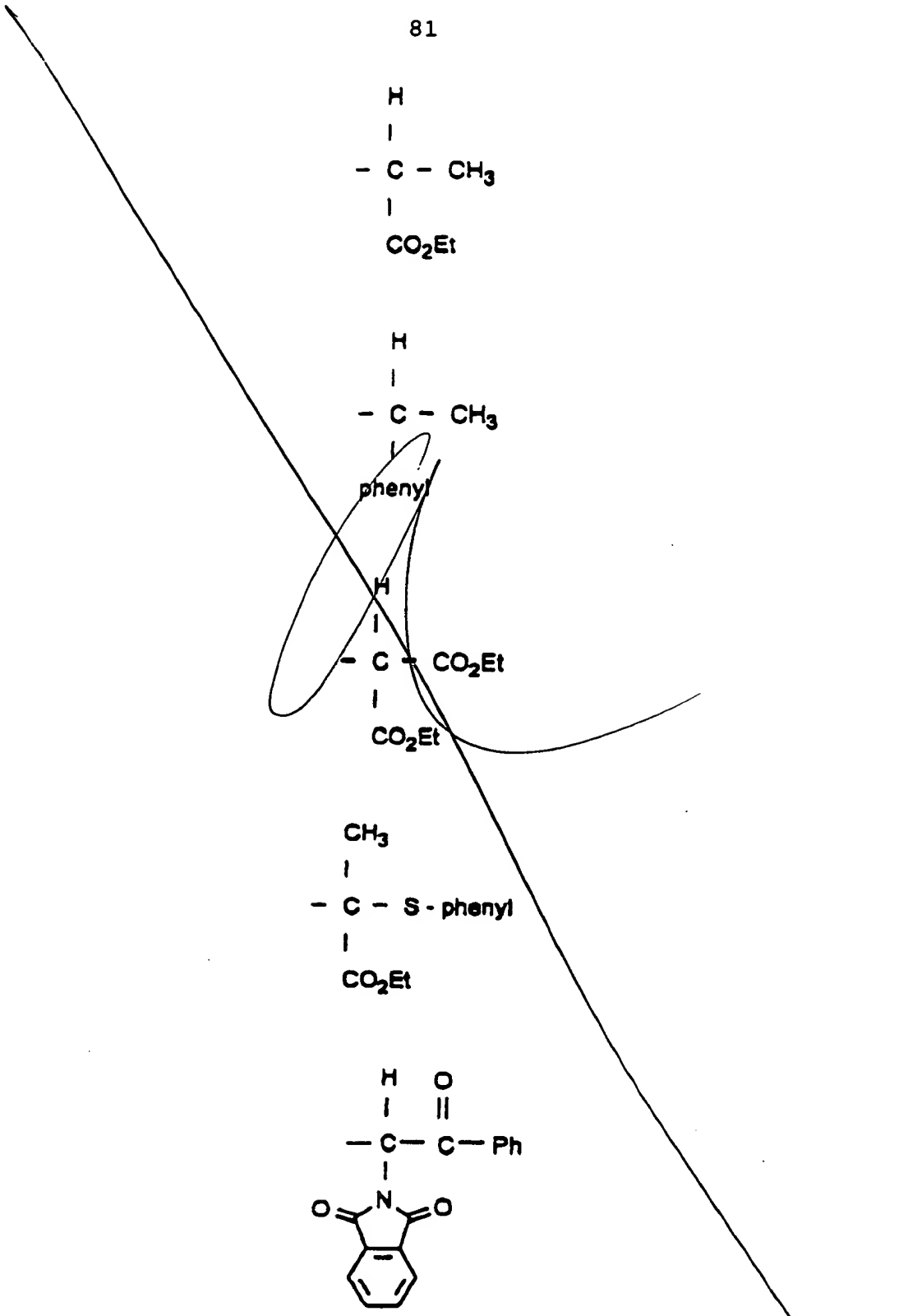
11. Process according to claim 1, characterized in that, in the case of the compounds of formula (IB) and (IIB), R^2 and/or R^3 exert a π withdrawing effect.

12. Process according to claim 11, characterized in that R^2 and/or R^3 represent a carbonyl or (hetero)aromatic group.

13. Process according to claim 1, characterized in that, in the case of the compounds of formula (IB) and (IIB), R^2 and/or R^3 exert a Σ withdrawing effect.

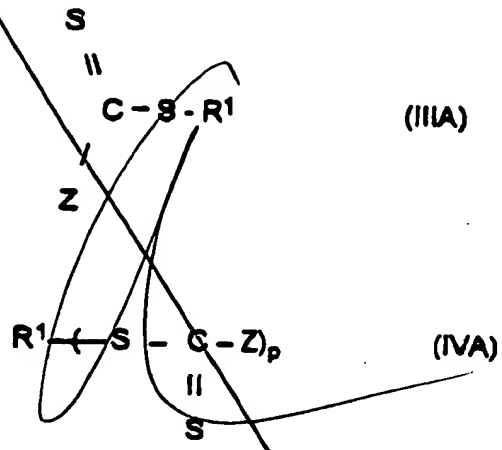
14. Process according to claim 1 or 13, characterized in that R^2 and/or R^3 represent an alkyl group substituted with electron-withdrawing groups.

15. Process according to any one of the preceding claims, characterized in that R^1 is chosen from the groups:



16. Process according to any one of claims 1 to 10 and 15 to 6, characterized in that the precursor

compound of general formula (IIA) is a polymer and in that the said polymer comes from the radical polymerization of an ethylenically unsaturated monomer of formula: $CXX'(=CV\text{-}CV')_b=CH_2$ during which the said monomer is brought into contact with a radical polymerization initiator and a compound of general formula (IIIA) or (IVA):

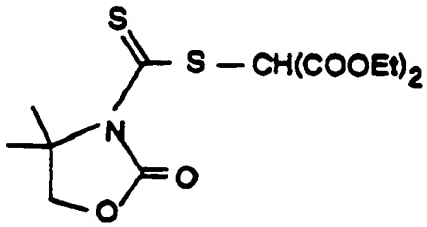


(IIIA)

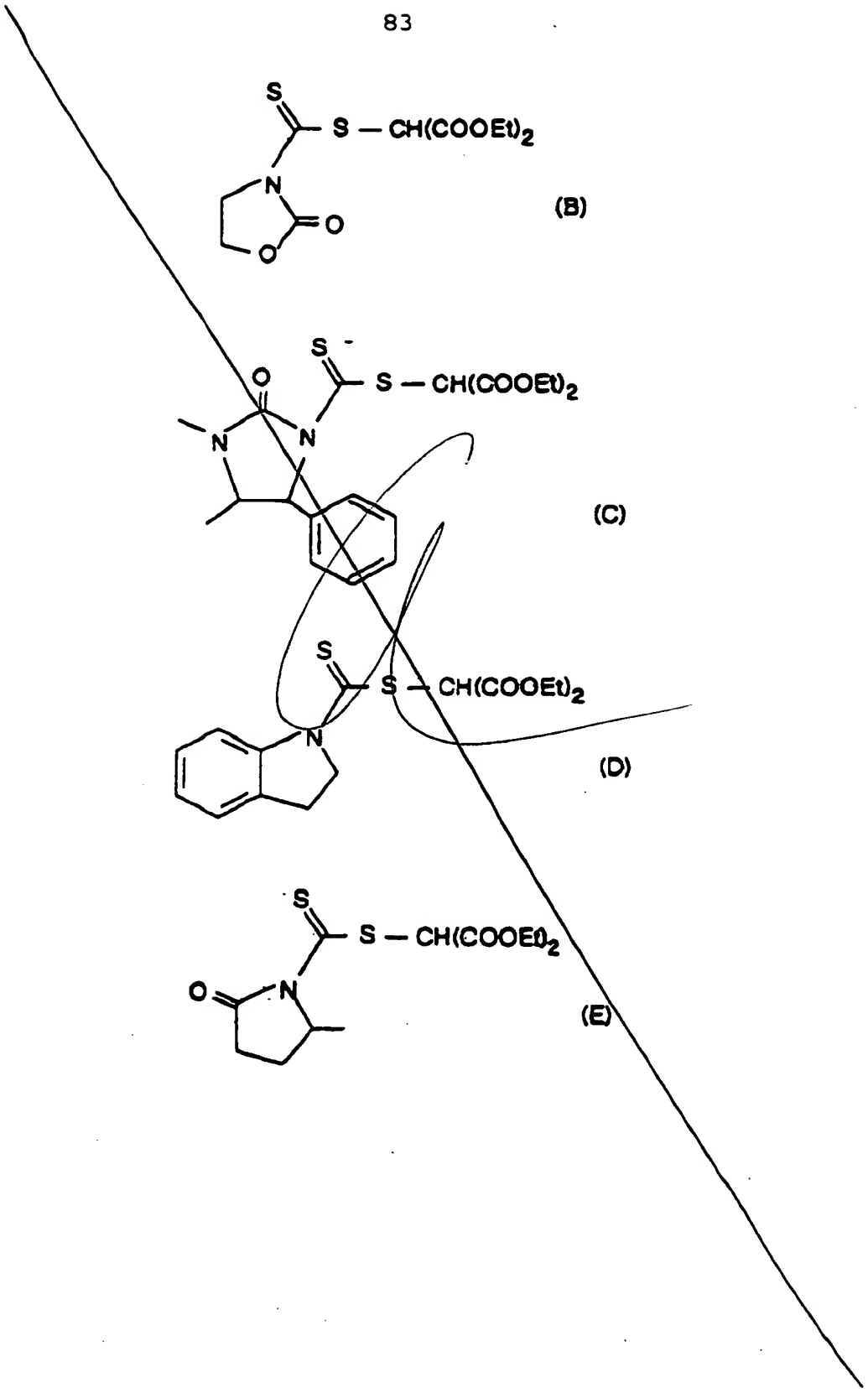
(IVA)

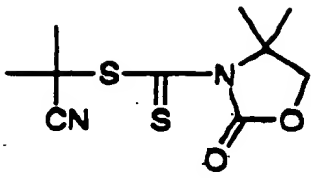
p being between 2 and 10.

17. Process according to the preceding claim, characterized in that the compound of formula (IIIA) is chosen from compounds of the following formulae:

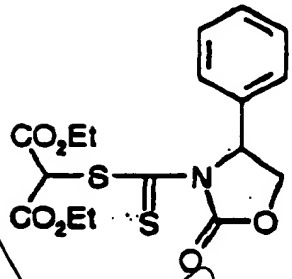


(A)

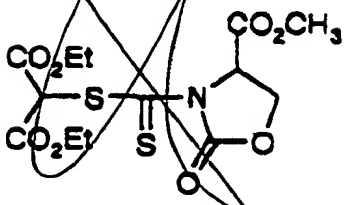

S
S — CH(COOEt)2
N
O
O
(B)
S
S — CH(COOEt)2
O
N
N
(C)
S
S — CH(COOEt)2
N
(D)
S
S — CH(COOEt)2
O
N
(E)



(F)

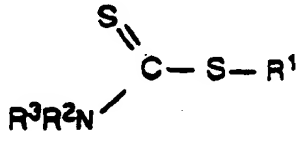


(G)

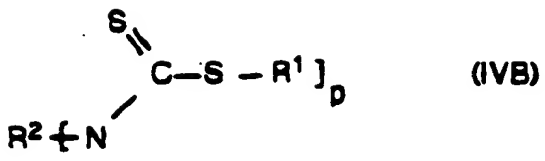


(H)

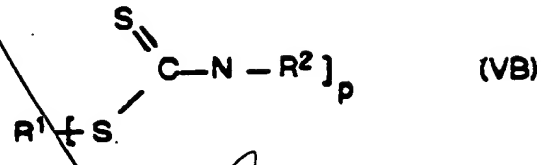
18. Process according to any one of claims 1 and 11 to 16, characterized in that the precursor compound of general formula (IIB) is a polymer and in that the said polymer comes from the radical polymerization of an ethylenically unsaturated monomer of formula: $CXX'(=CV\text{-}CV')_b=CH_2$ during which the said monomer is brought into contact with a radical polymerization initiator and a compound of general formula (IIIB), (IVB) or (VB):



(IIIB)



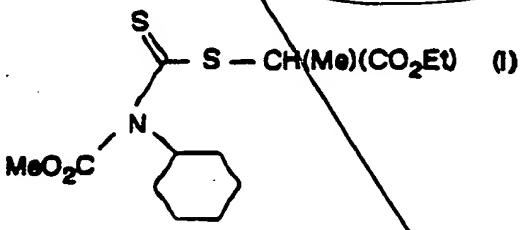
(IVB)



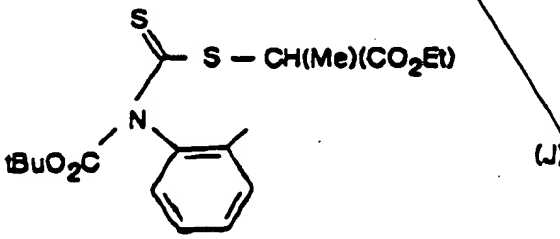
(VB)

p being between 2 and 10.

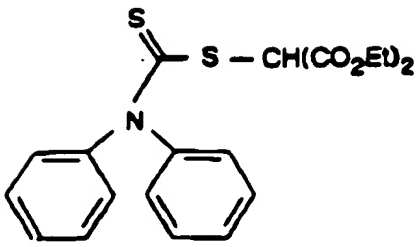
19. Process according to the preceding claim, characterized in that the compound of formula (IIIB) is chosen from the compounds of the following formulae:



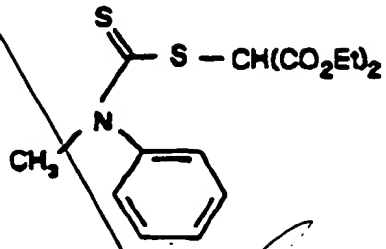
(I)



(J)



(K)



(L)

20. Process for preparing multiblock polymers, characterized in that the implementation of the process according to one of claims 1 to 15 is repeated at least once, using:

- different monomers from those of the previous implementation, and

- instead of the precursor compound of formula (IIA) or (IIB), the block polymer coming from the previous implementation.

21. Block polymer capable of being obtained by the process according to one of the preceding claims.

22. Block polymer according to the preceding claim, characterized in that it has a polydispersity index of at most 2.

23. Block polymer according to the preceding claim, characterized in that it has a polydispersity index of at most 1.5.

24. Block polymer according to any one of claims 21 to 23, characterized in that it has at least two polymer blocks chosen from the following combinations:

- polystyrene/polymethyl acrylate,
- polystyrene/polyethyl acrylate,
- polystyrene/poly(*tert*-butyl acrylate),
- polyethyl acrylate/polyvinyl acetate,
- polybutyl acrylate/polyvinyl acetate,
- poly(*tert*-butyl acrylate)/polyvinyl acetate.

25. Polymer capable of being obtained by the process which consists in bringing an ethylenically unsaturated monomer of formula: $CXX'(=CV\text{-}CV')_b=CH_2$, a radical polymerization initiator and a compound of formula (IIIA), (IIIB), (IVA), (IVB) or (VB) into contact with one another.

26. Polymer according to claim 25, characterized in that it has a polydispersity index of at most 2.

27. Polymer according to claim 25 or 26, characterized in that it has a polydispersity index of at most 1.5.

28. Compound of general formula (IIA) or (IIB), characterized in that it has a polydispersity index of at most 2.

Add A2

Add B6

Add C2